



Selected Macroeconomic Drivers of Inflation in Kenya

Vincent Mogire Okara and Cyrus Mutuku*

Research Department, Kenya Revenue Authority, Kenya

*Corresponding author: Cyrus Mutuku, Research Department, Kenya Revenue Authority, Kenya, E-mail: mutukucmm@gmail.com

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Abstract

High and volatile inflation is a threat to good economic performance and has negative effects on many of the poor. Economic growth took off in 2004 in Kenya, but alongside higher growth, there has been rapid inflation and large inflation volatility. The study sought to establish the effect of unemployment, narrow money supply, wide money supply and level of GDP on inflation in Kenya. The study relied on secondary annual time series data. The sources of the secondary data were the Kenya Bureau of Statistics, Central Bank, IMF and World Bank. The study employed the use of a Vector Autoregression (VECM) model due to its robustness in forecasting. The corrected data was first subjected to unit root test at levels using Augmented Dickey Fuller, and Philips Perron methods. The data was found to be non-stationary at level but stationary at first difference. The data was then tested for cointegration using Johansen procedure. Modeled variables were found to have long term relation. The Vector Error Correction Model (VECM) was used to determine short term relations among the variables. It was established that GDP growth rate, narrow money supply, unemployment and exchange rates could significantly determine inflation. Modeled variables passed stability test as well as diagnostic tests thus were fit for analysis. Study highly recommends that the government should complete the planned projects under the vision 2030 to grow the GDP by the projected 10% annually and thus reduce inflation.

Keywords: Macroeconomics; Labor market; Inflation; Economy

Introduction

The Kenyan economy registered improved economic performance in 2012 with an annual growth of 4.6% in GDP compared to 4.4% in 2011. The macroeconomic environment witnessed improved price and exchange rate stability. However, per capita income growth, which is largely explained by labor market dynamics, has been relatively slow at 1.7% in 2012. The Kenyan labor market is characterized by a large share of informal sector employment, which partly explains the low levels of income per capita and productivity (KIPPRRA).

Macroeconomic stability should remain a top policy priority for the government as there are potential risks emanating from internal and external imbalances. These include: fiscal pressure arising from implementation of Medium Term Plan programs, the 2010 Constitution, and demands for higher wages and salaries; a growing current account deficit and investment-savings resource gap. The

government should be ready to respond flexibly to the changing economic landscape in order to ensure exchange rate stability, and also ensure that inflation expectations are anchored within the policy target (KIPPRRA).

Experimental

The cost of living in Kenya has continuously risen at an alarming rate over the years. The problem is clearly getting worse, and it now presents the appearance of becoming uncontrollable. Figure 1 shows the inflation rates of selected years for Kenya, Sub Saharan African Countries and the world.

From Figure 1, it is evident that the annual inflation rate has remained high in the recent years averaging a double digit in the past decade and reaching highest 26.2% in the year 2008. This however was attributed to the shortage of goods and resources following the 2007 post-election violence. Annual inflation decreased from 14.0% in 2011 to 9.4% in 2012. The decline in inflation was largely attributed to better food supply resulting from favorable weather conditions.

In general, the inflation rate for Kenya has remained above the SSA countries and the world for the period 2000 to 2016. Kenyan Inflation has equally remained above the CBK target of 5% with a margin of plus or minus 2.5% for the same period.

According to Heather, Phillips formulated the relationship between unemployment and inflation and came up with a statistical representation which he referred to as the Phillips Curve. The Phillips Curve shows the relationship between unemployment and inflation. The curve sloped down from left to right and seemed to offer policy makers with a simple choice - you have to accept inflation or unemployment. You can't lower both. Or, of course, accept a level of inflation and unemployment that seemed to be acceptable. He further argued that governments have the power to regulate the volume of aggregate demand in the economy. If they believe the costs of inflation to be high, they can prevent the inflation by tightly controlling aggregate demand. The price they must pay is a high level of unemployment. If the government feels that the costs of inflation for an economy are low, it can gain the advantages of fuller employment via a higher volume of aggregate demand.

In the contrary, Milton Friedman in his theory on natural unemployment stated that an increase in the inflation level will lead to an increase in unemployment level; this is because the economy has to have that portion of unemployment which is referred to as natural unemployment [1].

GDP and inflation are both considered important economic indicators. It is widely believed that there is a relationship between the two. The problem is that there are disagreements as to what that relationship is or how it operates. As a result, when governments make decisions based on these pieces of information, the outcome often cannot be guaranteed. Exploration of the relationship between GDP and inflation is best begun by developing an understanding of each term individually [2].

GDP is an acronym for gross domestic product, which is the value of a nation's goods and services during a specified period. This figure is generally regarded as an important indicator of an economy's health. Inflation refers to a situation where price level increase on average or when the amount of currency increases. As a result, money has less

purchasing power. In the past decade, Kenya's economy grew at an average of 3.8%. This is better than in previous decades, but below its potential, its ambition, and its peers. While an increasing number of African countries have already reached high Middle Income status, Kenya has lagged behind. Today, out of 48 sub-Saharan African countries, 22 countries have reached a per-capita income of US\$ 1025—the official threshold of middle income. At about US\$ 820, Kenya's GDP per capita, ranks 24th and only represents about half the sub-Saharan Africa (SSA) [3].

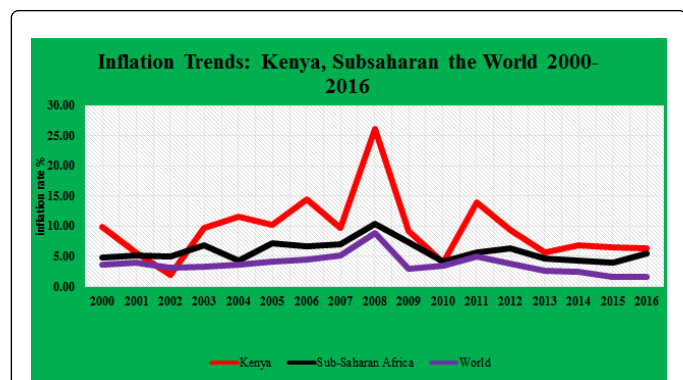


Figure 1: Inflation Rates in Kenya, SSA and the World, Source: Author, Data from World Bank.

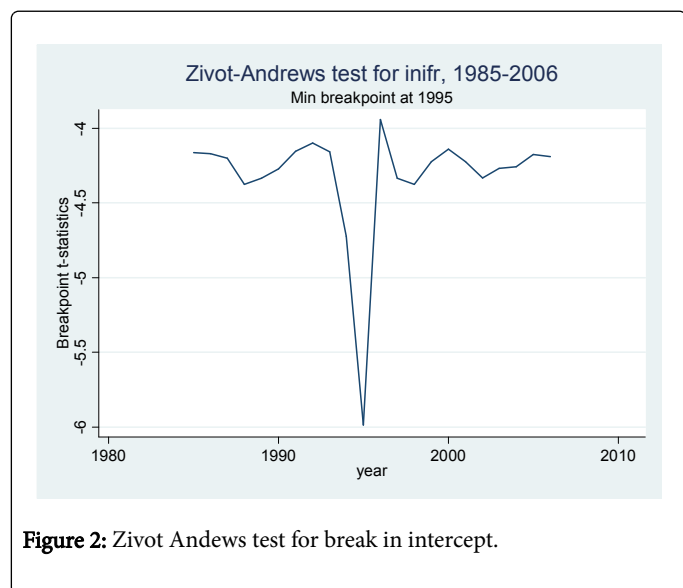


Figure 2: Zivot Andrews test for break in intercept.

Prices are usually pushed up when people are competing for a limited supply of items. This means that an increase of GDP, or growth in the amount of goods and services, should equate to a reduction in the level of prices for those items, or that deflation should occur. GDP and inflation are often associated with one another because governments and central banks often make decisions based on these figures and they attempt to manipulate them. If an economy is not growing or is not growing fast enough, a Central Bank may lower interest rates to make borrowing more attractive. The logic behind this is that it will encourage spending, which will lead to a rise in GDP. The drawback of this move is that, according to many popular beliefs, it will also prompt inflation [4].

If an economy is growing too fast, which could lead to shortages because people are demanding products and services faster than they can be supplied, moves may be made to slow GDP. This may be done by increasing interest rates, which is considered a means of making money harder to come by because borrowing is more expensive. According to many, this should help to control inflation because the effect should be less demand for goods and services. Problems tend to arise, however, because actions focusing on manipulating GDP and inflation may not produce the intended effects, which tend to fuel the debate regarding their relationship [5].

Kenya was not only hit by the commodity-price hike and the financial crisis, but also post-election violence in 2008. As a result, real GDP growth dropped from over 7% in 2007 to below 1.5% in 2008 while inflation increased to over 20%. The monetary policy response was to reduce interest rates to stimulate economic growth. In spite of lax monetary policy, inflation declined from 2009 until late 2010. Inflation then rose again, but the authorities continued to maintain loose monetary conditions. This resulted in rapid depreciation of the Kenyan shilling (KES); its value dropped from about 80 shilling per US dollar in early 2011 to over 100 shilling per US dollar in October 2011. To prevent further depreciation of KES and rise in inflation, the monetary authorities increased the Central Bank rate sharply, pushing up the interbank rate to about 17%, from less than 2% in January 2011. The response seems to have been an appreciation of the KES and decline in inflation. The tight monetary policy stance was maintained during the first half of 2012. The relatively high rates of inflation in Kenya consequently raise questions about monetary authorities' control over inflation (KIPPR).

	ADF		Phillips Perron	
	P values		P values	
Variable	At level	1st diff.	At level	1st diff.
Log ifr	0.0003	0	0.0003	0
Log gdp	0	0	0	0
Log uem	0	0	0	0
Log exr	0.0378	0	0.0459	0
Log irate	0.3214	0	0.2709	0
Log msw	1	0.0002	0.8603	0.0001

Table 1: Unit Root Test at Level, Data Analysis Results, 2016.

A monetary policy stance that is consistent with inflation targets is a prerequisite to achieving high and stable economic growth and hence leads to employment creation and poverty reduction. The Kenya vision 2030 highlights that maintaining a low and stable inflation is critical for long term economic and social prosperity. High and variable inflation leads to inefficient allocation of resources and makes planning for the future much more difficult. To avoid adverse effects of high inflation, the Central Bank of Kenya aim to pursue monetary policy that aims at maintaining a low rate of inflation of below 5% [6].

To this extent, the Kenyan Monetary policy committee meets every month to review recent economic developments and outcomes of the policy decisions made and the outlook of the domestic and global economies to be able to make salient decisions on the policy outlook.

Despite the efforts the Kenyan inflation rate has remained above the policy target.

Macroeconomists, Central Bankers and policymakers have often emphasised the costs associated with high and variable inflation. Inflation imposes negative externalities on the economy as it interferes with an economy's efficiency. This leads to more conservative investment strategies, ultimately leading to lower levels of investment and economic growth. Inflation also reduces a country's international competitiveness, by making its exports relatively more expensive, thus impacting on the balance of payments. Moreover, inflation can interact with the tax system to distort borrowing and lending decisions [7].

Variable	ZA	Year
INIFR	-5.984*	1995
INGDP	-3.679	1991
INMSW	-10.119*	1998
INMSN	-2.560	2006
INUEM	-4.305	2001
INEXR	-3.409	1991
IIRATE	-2.835	1994

Table 2: Unit Root Test with Structural Breaks in Intercept, Data Analysis Results, 2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	D_linf	D_lm1	D_lgdp	D_luem	D_lexr	D_lirate
L_ce1	-0.167*	-0.0142	0.344***	-0.0704*	0.0278**	0.0316**
	(0.0913)	(0.0297)	(0.124)	(0.0380)	(0.0127)	(0.0159)
Constant	-0.0131	0.112***	-0.00762	0.00225	0.0709***	0.00660
	(0.133)	(0.0432)	(0.181)	(0.0553)	(0.0184)	(0.0231)
Observations	37	37	37	37	37	37
***p<0.01, **p<0.05, *p<0.1						

Table 3: Summary for short run Vector Error Correction Model M1 Channel, Standard errors in parentheses.

Quantity theory of money: According to this theory, an increase in the quantity of money leads to a proportional increase in the price level and vice versa. All markets for goods continuously clear and relative prices adjust flexibly to ensure that equilibrium is reached. Therefore, the economy is assumed to be always at full employment level, except for temporary deviations caused by real disturbances [9].

Keynesian theory of aggregate demand: The Traditional Keynesian model comprises of the Aggregate Demand (AD) and Aggregate Supply (AS) curves, which illustrates the inflation – growth relationship. According to this model, in the short run, the (AS) curve is upward sloping rather than vertical, which is its critical feature. If the AS curve is vertical, changes on the demand side of the economy affect only prices. However, if it is upward sloping, changes in AD affect prices and output [10]. This holds with the fact that many factors drive the inflation rate and the level of output in the short-run. These include changes in: expectations; labor force; prices of other factors of

production, fiscal and/or monetary policy. Economy is assumed to balance out in this 'steady state' situation.

Literature Review

Theoretical literature

Keynesian philips curve: Phillips curve depicts an inverse relationship between inflation and unemployment. When inflation is high, unemployment is low, and vice-versa. When drawn on a graph, with the inflation rate on the vertical axis and the unemployment rate on the horizontal axis, the relationship between the variables showed a downward sloping curve, the Phillips curve. It is little known that the American economist Irving Fisher pointed to this kind of Phillips curve relationship back in the 1920s [8]. One implication of this for government policy was that, monetary policy and/or fiscal policy (i.e. deficit spending) could be used to stimulate the economy, raising gross domestic product and lowering the unemployment rate. Moving along the Phillips curve, this would lead to a higher inflation rate, the cost of enjoying lower unemployment rates [1].

Money and monetarism: Friedman challenged the concept of the Phillips Curve. His argument was based on the premise of an economy where the cost of everything doubles. Individuals have to pay twice as much for goods and services, but they don't mind, because their wages are also twice as large, Individuals anticipate the rate of future inflation and incorporate its effects into their behavior. As such, employment and output is not affected.

Empirical literature: Karanossou [11] showed that the New Keynesian Phillips Curve (NKPC) approach is an empirical failure by every measure ranging from methodological failure in time-series econometrics to the absence of a wage equation in New Keynesian Phillips Curve (NKPC). They despised the reliance on the New Keynesian Phillips Curve (NKPC) by literature and most other

research on inflation dynamics on measures of goodness of fit, which can be misleading when most of the explanatory power is contributed by the lagged dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	D_linf	D_lm2	D_lgdp	D_luem	D_lexr	D_lirate
L_ce1	-0.336***	0.0139	0.380**	-0.117**	0.0343*	0.0383*
	(0.125)	(0.0150)	(0.187)	(0.0537)	(0.0185)	(0.0232)
Constant	-0.00501	0.146***	-0.0152	0.00493	0.0702***	0.00581
	(0.127)	(0.0152)	(0.189)	(0.0544)	(0.0188)	(0.0235)
Observations	37	37	37	37	37	37
***p<0.01, **p<0.05, *p<0.1						

Table 4: Summary for short run Vector Error Correction Model M2 Channel, Standard errors in parentheses, Data Analysis Results, 2017.

Shansuddin and Holmes [12] conducted both the co integration test of the monetary theory of inflation and the Granger-causality test between the variables in the system. They developed a univariate and multivariate time series models to forecast inflation rates using quarterly time series data for Pakistan, from 1972-2 to 1993-4 for empirical investigation. The results suggest no co integrating or long-run relationship between the variables in the monetary model and that there is some evidence of Granger-causality running from inflation to output growth.

Fumikata [13] empirically examined the relationship between inflation rate and unemployment rate using the Vector Error Correction Model (VECM) analysis to test the existence of the Phillips curve in Malaysia for the period 1973 to 2004. The most interesting finding of this paper is the existence of a long-run and trade-off relationship and also a causal relationship between the unemployment rate and the inflation rate in Malaysia.

Marta examines monetary policy in Albania during the transition period. Estimates from a vector Auto Regression Model (VAR) of key macroeconomic variables which include money growth, inflation, exchange rate, remittances and the trade balance, demonstrate the weak link between money supply and inflation up to mid-2000. In an almost similar study [14] explored the vector auto regression to model the relationship between CPI, money supply and exchange rate in Ukraine. The study found that money supply responds to positive shocks in price level.

Studies by Kormendi and Meguire, Tobins, Fischer, Gregorio and Stockman found a significant negative effect of GDP on inflation in pooled cross-section time series regressions for a large set of countries while using co-integration and error correction models, Malik and Chowdhury found a long-run positive relationship between GDP growth rate and inflation for four South Asian countries [15-18].

Empirical model: Following the underlying literature, the study employed a VECM model. The VECM model posited a set of relationships between past lagged values of all variables in the model and the current value of each variable in the model. The model contained five variables (inflation rate (CPI), Narrow Money supply, Wide Money Supply, Unemployment rate, Gross Domestic Product growth, exchange rate and interest rate). The long run cointegration model took the form

$$\ln IFR_t = \ln \beta_0 + \beta_1 \ln UEM_t + \beta_2 \ln MSN_t + \beta_3 MSW_t + \beta_4 \ln GDP_t + \beta_5 \ln irate + \beta_6 \ln exr + \mu_t$$

Where; IFR=Level of inflation (consumer price index) UEM=Unemployment rate MSN=Narrow Money supply (M1) MSW=Wide Money Supply (M2) GDP=Gross Domestic Product growth rate irate=interest rate, exr=exchange rate μ =Error term, and β_i $i=0, 1, 2, 3, 4, 5, 6$ are the parameter to be estimated

	(M1 Channel)	(M2 channel)
VARIABLES	linf	linf
lgdp	-1.186***	-0.562***
	-0.182	-0.118
luem	-2.028**	-1.403***
	-0.641	-0.426
lm1	0.681**	.
	-0.2192	.
lm2	.	0.338
	.	-0.237
lexr	-1.348***	-0.906*
	-0.354	-0.551
lirate	-0.686	-0.355
	-0.639	-0.515
Constant	-6.238	-4.567
Observations	38	38
***p<0.01, **p<0.05, *p<0.1		

Table 5: Summary statistics of Cointegration Equations M1 and M2 Channels, Data Analysis Results, 2017.

Data types and sources: Secondary data was utilized in the study. The data was obtained from Kenya Bureau of statistics and World Bank

and central bank of Kenya. The set of data for this study was time series data from 1980 to 2017.

Results and Discussion

Unit root test results in level and first difference

The results of unit root test for variables in their levels and first difference are shown in Table 1.

The critical values for interpolated Zivot Andrews test were -5.43 at 1% and -4.80 at 5%. The next test that was performed was Zivot Andrews test to find out if there were structural breaks. The results are reported in Table 2 for Zivot Andrews test for break in intercept. The results show that inflation rate had a significant break in the intercept in the year 1999. The t value -5.984. This was attributed to excessive inflation in the year 1995 as a result of the change from fixed exchange regime to floating exchange rate regime (Figure 2, Tables 3-5).

The cointegration results for both M1 channel indicates that GDP, unemployment rate and exchange rate have a negative effects on inflation. On the other hand narrow money supply had a positive Impact on inflation. In the M2 channel gdp growth rate, unemployment and exchange rate equally had a negative impact on inflation.

The results equally depicts that narrow money supply has a strong impact on inflation that broad money supply. This is evidenced by the significant coefficient of M1 as opposed to M2. The data further depicts that the Kenyan economy conforms to the Keynesian Philips curve that gives the short run relationship between inflation and unemployment.

Conclusion

Findings of this study suggest that in the short term the factors that significantly determine the inflation rates in Kenya include lagged inflation, interest rate, exchange rate, unemployment and GDP. In the long run GDP, unemployment rate narrow money supply and exchange rate significantly determines the rate of inflation in Kenya in both the M1 channel. While in M2 channel its GDP, unemployment rate and exchange rate that had a significant effect on inflation. Based on this study it can therefore be concluded that appropriate application of the monetary policy can to a great extent help to curb inflation in Kenya.

Policy recommendations

The study therefore recommends that the government should focus in the implementation of the various projects that were proposed in the country's development blue print vision 2030 that is actualized in the various medium term plans. This will help in growing the economy by the projected rate of 10% and as result reduce inflation to the CBK target levels.

The study further recommends that the government CBK should consider increasing the minimum level of reserves to 5 months of import cover from the 4 months, as this will ensure there is enough reserves to cushion the currency in the event of externals shocks. This as a result will help in making the inflation rate stable in a country. The country should further adhere to the IMF rules that govern the

precautionary facility as this will equally help in making the exchange rate stable and thus inflation.

Disclaimer

"This paper represents the opinions of the authors, and is the product of professional research. It is not meant to represent the position or opinions of the KRA or its Members, nor the official position of any staff members".

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